

Application No.: 09/623,487
Reply to Office Action Dated: May 27, 2003
Amendment Dated: November 20, 2003

IN THE CLAIMS

Please amend the claims as follows:

Claims 1-8 (Canceled)

Claim 9 (Currently Amended) An emulsion paint, comprising:

i) a polymeric binder, which comprises at least one copolymer P of ethylenically unsaturated monomers M in the form of an aqueous polymer dispersion;

ii) at least one inorganic pigment;

iii) an inorganic filler/extender; and

iv) an auxiliary;

wherein said copolymer P has a glass transition temperature Tg in the range of from -10 to +50°C; and

wherein said copolymer P consists of the following units in polymerized form

a) 20 to 80 % by weight of at least one monomer M2a, whose homopolymer has a glass transition temperature of >30°C, and which is selected from the group consisting of styrene, α -methylstyrene, methyl methacrylate, ethyl methacrylate, n-propyl methacrylate, iso-propyl-methacrylate, n-butyl methacrylate, iso-butyl methacrylate, tert-butyl methacrylate, vinyl acetate, acrylonitrile and methacrylonitrile;

b) 20 to 79.7 % by weight of at least one monomer M2b, whose homopolymer has a glass transition temperature of <20°C, and which is selected from the group consisting

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of C₁-C₁₂-alkyl acrylates, butadiene, vinyl versatates, ethyl acrylate, n-butyl acrylate, and 2-ethylhexyl acrylate;

c) 0.5 to 1.5 % by weight of c1) a first acidic monomer M1 selected from the group consisting of itaconic acid, a salt of itaconic acid, an anhydride of itaconic acid, and mixtures thereof, or c2) mixtures of said first acidic monomer with 0 to 0.75 % by weight of a second acidic monomer selected from the group consisting of acrylic acid and methacrylic acid, provided that a total amount of said first acidic monomer and said second acidic monomer is from 0.5 to 1.5% by weight, based on a total weight of said copolymer P; and a weight ratio of said second acidic monomer to said first acidic monomer does not exceed 1:1; and

d) 0.2 to 5% by weight of at least one monomer M3 having at least one urea group; wherein a sum of the amounts of monomers M1, M2a, M2b and M3 is 100% by weight;

wherein said emulsion paint contains no cross-linking additive.

Claim 10 (Previously Presented) The emulsion paint according to Claim 9, wherein itaconic acid is the sole acidic monomer M1.

Claim 11 (Canceled).

Claim 12 (Canceled).

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Claim 13 (Previously Presented) The emulsion paint according to Claim 9, wherein said aqueous dispersion of the copolymer P is obtained by free-radical aqueous emulsion polymerization of the monomers M using a monomer feed process in which all of said acidic monomer M1 is present in the monomer feed.

Claim 14 (Canceled).

Claim 15 (Previously Presented) The emulsion paint according to Claim 9, with a pigment volume concentration (pvc) > 10%.

Claim 16 (Currently Amended) A method of improving the wet abrasion resistance of a polymer-bound coating composition, comprising:

mixing a copolymer as a binder with said coating composition;

wherein said copolymer consists of the following units in polymerized form

a) 20 to 80 % by weight of at least one monomer M2a, whose homopolymer has a glass transition temperature of $>30^{\circ}\text{C}$, and which is selected from the group consisting of styrene, α -methylstyrene, methyl methacrylate, ethyl methacrylate, n-propyl methacrylate, iso-propyl-methacrylate, n-butyl methacrylate, iso-butyl methacrylate, tert-butyl methacrylate, vinyl acetate, acrylonitrile and methacrylonitrile;

b) 20 to 79.7 % by weight of at least one monomer M2b, whose homopolymer has a glass transition temperature of $<20^{\circ}\text{C}$, and which is selected from the group consisting

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of C₁-C₁₂-alkyl acrylates, butadiene, vinyl versatates, ethyl acrylate, n-butyl acrylate, and 2-ethylhexyl acrylate;

c) 0.5 to 1.5 % by weight of c1) a first acidic monomer M1 selected from the group consisting of itaconic acid, a salt of itaconic acid, an anhydride of itaconic acid, and mixtures thereof, or c2) mixtures of said first acidic monomer with 0 to 0.75 % by weight of a second acidic monomer selected from the group consisting of acrylic acid and methacrylic acid, provided that a total amount of said first acidic monomer and said second acidic monomer is from 0.5 to 1.5% by weight, based on a total weight of said copolymer P; and a weight ratio of said second acidic monomer to said first acidic monomer does not exceed 1:1; and

d) 0.2 to 5% by weight of at least one monomer M3 having at least one urea group; wherein a sum of the amounts of monomers M1, M2a, M2b and M3 is 100% by weight;

wherein said binder and said coating composition contains no cross-linking additive.

Claim 17 (Previously Presented) The method according to Claim 16, wherein the coating composition is an emulsion paint.

Claim 18 (Previously Presented) The emulsion paint as claimed in Claim 9, wherein said second acidic monomer is present; and

wherein a total amount of said first acidic monomer and said second acidic monomer is from 0.5 to 1.0 % by weight based on a total weight of said copolymer P; and

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provided that a weight ratio of said monoethylenically unsaturated carboxylic acid to said acidic monomer does not exceed 1:1.

Claim 19 (Previously Presented) The emulsion paint as claimed in Claim 9, wherein the aqueous dispersion of the copolymer P is obtained by free-radical aqueous emulsion polymerization of the monomers M using a monomer feed process in which all of the itaconic acid is present in the monomer feed.

Claim 20 (Previously Presented) The emulsion paint as claimed in Claim 9, wherein the aqueous dispersion of the copolymer P is obtained by free-radical aqueous emulsion polymerization of the monomers M using a monomer feed process in which at least 50% by weight of acidic monomer M1 are present in the monomer feed.

Claim 21 (Previously Presented) The emulsion paint as claimed in Claim 9, wherein the aqueous dispersion of the copolymer P is obtained by free-radical aqueous emulsion polymerization of the monomers M using a monomer feed process in which at least 50% by weight of the itaconic acid are present in the monomer feed.

Claim 22 (Previously Presented) The emulsion paint according to Claim 9, with a pigment volume concentration (pvc) > 40%.

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Claim 23 (Previously Presented) The emulsion paint according to Claim 9, with a pigment volume concentration (pvc) > 60%.

Claim 24 (Previously Presented) The emulsion paint according to Claim 9, wherein an amount of itaconic acid in said copolymer P is from 0.5 to 0.9 % by weight, based on a total weight of said copolymer P.

Claim 25 (Previously Presented) The emulsion paint according to Claim 9, wherein a weight ratio of said second acidic monomer to said first acidic monomer does not exceed 1:2.

Claim 26 (Previously Presented) The emulsion paint according to Claim 9, wherein a weight ratio of said second acidic monomer to said first acidic monomer does not exceed 1:3.

Claim 27 (Previously Presented) The emulsion paint according to Claim 9, wherein a weight ratio of said second acidic monomer to said first acidic monomer does not exceed 1:9.

Claim 28 (Previously Presented) The emulsion paint according to Claim 9, further comprising, in copolymerized form, 0 to 1% by weight of monomers M4 which comprise siloxane groups.

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Claim 29 (Previously Presented) The emulsion paint according to Claim 28, wherein said monomers M4 are selected from the group consisting of vinyltrialkoxysilanes, alkylvinyltrialkoxysilanes and (meth)acryloxyalkyltrialkoxysilanes.

Claim 30 (Previously Presented) The emulsion paint according to Claim 9, having a wet abrasion resistance of from 1700 to 4660.

Claim 31 (Previously Presented) The emulsion paint according to Claim 30, having a wet abrasion resistance of from 2800 to 4660.

Claim 32 (Currently Amended) An emulsion paint, comprising:

- i) a polymeric binder, which comprises at least one copolymer P of ethylenically unsaturated monomers M in the form of an aqueous polymer dispersion;
- ii) at least one inorganic pigment;
- iii) an inorganic filler/extender; and
- iv) an auxiliary;

wherein said copolymer P has a glass transition temperature T_g in the range of from -10 to +50°C; and

wherein said copolymer P consists of the following units in copolymerized form

- i) 20 to 80 % by weight of at least one monomer M2a, whose homopolymer has a glass transition temperature of >30°C, and which is selected from the group consisting of styrene, α -methylstyrene, methyl methacrylate, ethyl methacrylate, n-propyl methacrylate,

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iso-propyl-methacrylate, n-butyl methacrylate, iso-butyl methacrylate, tert-butyl methacrylate, vinyl acetate, acrylonitrile and methacrylonitrile;

ii) 20 to 79.7 % by weight of at least one monomer M2b, whose homopolymer has a glass transition temperature of $<20^{\circ}\text{C}$, and which is selected from the group consisting of C₁-C₁₂-alkyl acrylates, butadiene, vinyl versatates, ethyl acrylate, n-butyl acrylate, and 2-ethylhexyl acrylate;

iii) 0.5 to 1.0 % by weight of itaconic acid as monomer M1; and

iv) 0.2 to 5% by weight of at least one monomer M3 having at least one urea group;

wherein a sum of the amounts of monomers M1, M2a, M2b and M3 is 100% by weight;

wherein said copolymer P contains no polymerized acrolein;

wherein said emulsion paint contains no cross-linking additive.

Claim 33 (Previously Presented) The emulsion paint according to Claim 32, wherein said monomer M2a is selected from the group consisting of methyl methacrylate, n-butyl methacrylate and styrene; and

wherein said monomer M2b is selected from the group consisting of C₁-C₁₂alkylacrylates.

Claim 34 (Previously Presented) A method of improving a wet abrasion resistance of a polymer bound emulsion paint, comprising:

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mixing an aqueous dispersion of a copolymer P as a binder into a latex paint which additionally comprises at least one inorganic pigment, an inorganic filler/extender and an auxilliary;

wherein said copolymer P comprises in polymerized form

a) as monomer M 1:

0.5 to 1.0% by weight of an acidic monomer selected from the group consisting of itaconic acid, a salt of itaconic acid an anhydride of itaconic acid and a combination thereof, and

0 to 0.5% by weight of a second monomer selected from the group consisting of acrylic acid and methacrylic acid based on a total weight of said copolymer P;

provided that a total amount of said acidic monomer and said second monomer is from 0.5 to 1.0% by weight, based on the total weight of said copolymer P, and the weight ratio of said second monomer to said acidic monomer does not exceed 1:1;

b) 90 to 99.9 % by weight of monomers M2 selected from the group consisting of vinylaromatic monomers, esters of ethylenically unsaturated C₃-C₈ monocarboxylic acids with C₁-C₁₂-alkanols, and vinyl esters of aliphatic C₁-C₁₂ monocarboxylic acids, based on a total amount of said copolymer P; and

c) 0.1 to 10 % by weight of at least one monomer M3 which comprises an urea group, based on the total weight of copolymer P; and

wherein said aqueous polymer dispersion contains no polymerized acrolein;

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ii) at least one inorganic pigment,

iii) an inorganic filler or an inorganic extender; and

iv) an auxiliary;

wherein said aqueous dispersion or said latex paint contains no cross-linking additive.

Claim 35 (Previously Presented) The method according to Claim 34, wherein said copolymer P is the only binder.

Claim 36 (Previously Presented) The method according to Claim 34, wherein said emulsion paint has a pigment volume concentration of >10%.

Claim 37 (Previously Presented) The method according to Claim 34, wherein said emulsion paint has a pigment volume concentration of >40%.

Claim 38 (Previously Presented) The method according to Claim 34, wherein said emulsion paint has a pigment volume concentration of >60%.

Claim 39 (Currently Amended) The method according to Claim 34, wherein said copolymer P comprises in copolymerized form

i) 20 to 80 % by weight of at least one monomer M2a, whose homopolymer has a glass transition temperature of >30 °C, and which is selected from the group consisting of styrene, α -methylstyrene, methyl methacrylate, ethyl methacrylate, n-propyl methacrylate,

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iso-propyl-methacrylate, n-butyl methacrylate, iso-butyl methacrylate, tert-butyl methacrylate, vinyl acetate, acrylonitrile and methacrylonitrile;

ii) 20 to 79.7 % by weight of at least one monomer M2b, whose homopolymer has a glass transition temperature of $<20^{\circ}\text{C}$;

iii) 0.5 to 1.0 % by weight of itaconic acid as monomer M1; and

iv) 0.2 to 5% by weight of at least one monomer M3 having at least one urea group;

wherein a sum of the amounts of monomers M1, M2a, M2b and M3 is 100% by weight.

Claim 40 (Previously Presented) The method according to Claim 34, wherein a wet abrasion resistance of from 1700 to 4660 is achieved.

Claim 41 (Previously Presented) The method according to Claim 34, wherein a wet abrasion resistance of from 2800 to 4660 is achieved.

Claim 42 (Previously Presented) An emulsion paint, comprising:

i) a polymeric binder, which comprises at least one copolymer P of ethylenically unsaturated monomers M in the form of an aqueous polymer dispersion;

wherein said copolymer P has a glass transition temperature T_g in the range of from -10 to $+50^{\circ}\text{C}$; and

wherein said copolymer P comprises in polymerized form

a) as monomer M 1:

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0.5 to 1.0% by weight of an acidic monomer selected from the group consisting of itaconic acid, a salt of itaconic acid an anhydride of itaconic acid and a combination thereof, and

0 to 0.5% by weight of a second monomer selected from the group consisting of acrylic acid and methacrylic acid based on a total weight of said copolymer P;

provided that a total amount of said acidic monomer and said second monomer is from 0.5 to 1.0% by weight, based on the total weight of said copolymer P, and the weight ratio of said second monomer to said acidic monomer does not exceed 1:1;

b) 90 to 99.9 % by weight of monomers M2 selected from the group consisting of vinylaromatic monomers, esters of ethylenically unsaturated C₃-C₈ monocarboxylic acids with C₁-C₁₂-alkanols, and vinyl esters of aliphatic C₁-C₁₂ monocarboxylic acids, based on a total amount of said copolymer P; and

c) 0.1 to 10 % by weight of at least one monomer M3 which comprises an urea group, based on the total weight of copolymer P; and

wherein said aqueous polymer dispersion contains no polymerized acrolein;

ii) at least one inorganic pigment,

iii) an inorganic filler or an inorganic extender; and

iv) an auxiliary;

wherein said emulsion paint contains no cross-linking additive.

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Claim 43 (Previously Presented) The emulsion paint according to Claim 9, wherein said unit c1) is present.

Claim 44 (Previously Presented) The emulsion paint according to Claim 9, wherein said unit c2) is present.

Claim 45 (Previously Presented) The emulsion paint according to Claim 28, wherein said monomer M4 is present.

Claim 46 (Canceled)

Claim 47 (Previously Presented) The emulsion paint according to Claim 9, wherein said auxiliary is selected from the group consisting of wetting agents, thickeners, defoamers, preservatives, hydrophobizing agents, biocides, fibers, film-forming auxiliaries and solvent.

Claim 48 (Previously Presented) The emulsion paint according to Claim 9, wherein said emulsion paint further comprises water.

Claim 49 (New) The emulsion paint according to Claim 42, wherein said monomers M comprise

at least one monomer M2a, whose homopolymer has a glass transition temperature of >30 °C, and which is selected from the group consisting of styrene, α -methylstyrene, methyl

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methacrylate, ethyl methacrylate, n-propyl methacrylate, iso-propyl-methacrylate, n-butyl methacrylate, iso-butyl methacrylate, tert-butyl methacrylate, vinyl acetate, acrylonitrile and methacrylonitrile; and

at least one monomer M2b, whose homopolymer has a glass transition temperature of $<20^{\circ}\text{C}$, and which is selected from the group consisting of C_1 - C_{12} -alkyl acrylates, butadiene, vinyl versatates, ethyl acrylate, n-butyl acrylate, and 2-ethylhexyl acrylate.

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BASIS FOR THE AMENDMENT

Claims 11 and 46 have been canceled.

The limitations of Claims 11 and 46 have been included in Claims 9, 16, 32, and 39.

New Claim 49 has been added as supported at page 6, lines 29-38 and by Claim 11 as originally filed.

No new matter is believed to have been added by entry of this amendment. Entry and favorable reconsideration are respectfully requested.

Upon entry of this amendment Claims 9-10, 13, 15-45 and 47-49 will now be active in this application.

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INTERVIEW SUMMARY

Applicants wish to thank Examiner Egwim for the helpful and courteous discussion with Applicants' Representative on November 12, 2003. During this discussion it was noted that the Examiner may consider the claims more favorably if monomers M2a and M2b are specified in the independent Claims. Applicants have amended the claims as discussed.